

# Laser Sources for Methane and Ozone Sensing for Earth Observation Science, Phase I

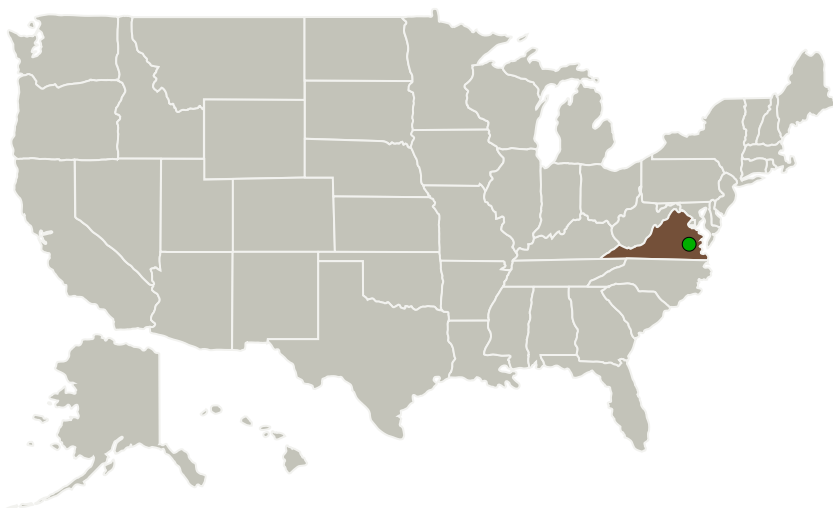
Completed Technology Project (2012 - 2012)



## Project Introduction

Lidar remote sensing of atmospheric gasses requires high-quality laser sources throughout the spectrum from the UV to the infrared. The objective of this SBIR program is development of lidar wavelength-tunable sources that exceed the performance of those currently available. The proposed program brings innovation in design of tunable non-linear parametric converters for efficient one-micron lasers to provide wavelengths in the near infrared through the near ultraviolet. This program targets the specific need for lasers for DIAL measurement of methane near 1.64  $\mu\text{m}$  and ozone near 300 nm. However, the technology developed will be useful for sensing of other molecular species including water vapor, oxygen, carbon dioxide, and a range of atmospheric pollutants. The proposed program focuses on optimizing performance of non-linear frequency converters to levels well beyond currently available devices. We anticipate improvements in the critical area of conversion efficiency, while maintaining the spectral purity required for DIAL systems. The devices developed will be designed to operate with a new generation of high efficiency Nd-based laser transmitters. These lasers achieve over 10% electrical efficiency; delivering 10s of Watts output at 1064 nm, in nanosecond pulses with diffraction-limited beam quality while operating at up to kilohertz pulse repetition rates. They are ideally suited to driving non-linear converters to provide over 1% system electrical efficiency throughout the desired tuning range.

## Primary U.S. Work Locations and Key Partners



Laser Sources for Methane and Ozone Sensing for Earth Observation Science, Phase I

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Organizations Performing Work	Role	Type	Location
Fibertek, Inc.	Lead Organization	Industry	Herndon, Virginia
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

## Primary U.S. Work Locations

Virginia

## Project Transitions

**February 2012:** Project Start**August 2012:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140275>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Fibertek, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

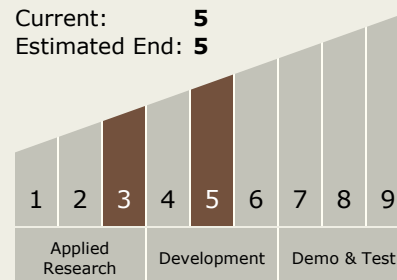
Carlos Torrez

### Principal Investigator:

Timothy M Shuman

## Technology Maturity (TRL)

Start: 3  
Current: 5  
Estimated End: 5



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## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
    - └ TX08.1.5 Lasers

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System